DSP

Lec 2 , Report 1

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sec 3

Q: Check the characterists of the following:

① $y(n) = \sum_{K=-a}^{n+1} x(K)$

② $y(n) = x(2n)$

③ $y(n) = x(-n)$

Solution:- حل المسألة الأولى قد يكون خاطئ، لا يعتمد

① $y(n) = x(-a) + x(-a+1) + \cdots + x(n+1)$

Ⓐ Dynamic system

Ⓑ Non Causal System

Ⓒ Assuming $n = -a$

$\therefore y(n) = x(n) + x(n+1)$

$y(n,K) = x(n-K) + x(n+1-K)$

$y(n-K) = x(n-K) + x(n+1-K)$

$y(n,K) = y(n-K)$

$\Rightarrow$ Time invariant System

Ⓓ Assuming $n = -a$

$y(n) = x(n) + x(n+1)$

$y_1(n) = x_1(n) + x_1(n+1)$

$y_2(n) = x_2(n) + x_2(n+1)$

$y_3(n) = x_1(n) + x_1(n+1) + x_2(n) + x_2(n)$

$y_3(n) = y_1(n) + y_2(n$

$\Rightarrow$ Linear System

Ⓔ Stable System

② $y(n) = x(2n)$

Ⓐ Dynamic System

Ⓑ Non Causal System

Ⓒ $y(n,K) = x(2n-K)$

$y(n-K) = x(2(n-K))$

$\Rightarrow$ Time variant System

Ⓓ $y_1(n) = x_1(2n)$

$y_2(n) = x_2(2n)$

$y_3(n) = x_1(2n) + x_2(2n)$

$y_3(n) = y_1(n) + y_2(n)$

$\Rightarrow$ Linear System

Ⓔ Stable System

⟹ Turn Over

(3) $y(n) = x(-n)$

(A) Dynamic System

(B) non causal System

(C) $y(n,k) = x(-n-k)$

$y(n-k) = x(-(n-k))$

$y(n,k) \neq y(n-k)$

$\Rightarrow$ Time variant System

(D) $y_1(n) = x_1(-n)$

$y_2(n) = x_2(-n)$

$y_3(n) = x_1(-n) + x_2(-n)$

$y_3(n) = y_1(n) + y_2(n)$

$\Rightarrow$ Linear System

(E) Stable System